

Periscope.

a.—ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM.

THE INNERVATION OF THE HEART. An exhaustive article on the ganglia in the frog's heart is to be found in Pflüger's *Archiv* (Bd. xxiii, H. 7 and 8), by M. Löwit. He details, in the first place, the researches of others, instigated by Stannius' well-known experiments. No agreement has yet been arrived at in explaining the effect of ligatures applied according to Stannius' direction. This uncertainty Löwit traces to the peculiar insertion of the veins into the right auricle. The figure described by the junction of the venous sinus with the heart is not situated in one plane, and cannot, hence, be accurately grasped by a ligature. The author, therefore, resorted to section with very sharp scissors with the following results :

He found, in the first place, an inhibitory apparatus in the venous sinus. Division of the sinus itself or irritation with a needle causes a *temporary* slackening of the heart's action. This effect is prevented by atropin. It is, hence, due to the irritation of some inhibitory organ, as Löwit thinks—of the vagus fibres themselves. Below the sinus no inhibitory organ could be traced. Separation of the sinus from the heart, by cutting *accurately* along the line of junction, permits the pulsations of both parts to continue, until the heart dies. As a rule, however, the auricles and ventricle beat somewhat slower than the detached sinus.

The contrary effect produced by Stannius' ligature—the stoppage of the auricle plus ventricle—is due to the fact that the ligature necessarily grasps more or less of the inter-auricular septum. If the upper portion of the septum be cut off from

the heart, previously detached from its venous sinus, the auricles (and ventricle) will either beat slower or stop altogether, according to the size of the piece removed. By cutting transversely through the auricles, the lower part of them with the attached ventricle will remain at rest definitely, unless artificially irritated. But by cutting through the auriculo-ventricular junction, *i. e.*, through the ganglia existing in the flaps forming the auriculo-ventricular valves, the ventricle will again commence pulsating, but only for a short time. When once at rest, fresh pulsations can be started by any stimulus. But if the ventricular apex, which contains no ganglia, is isolated, every stimulus evokes merely a single contraction. Extirpation of the valve-flaps containing the ganglia excludes the ventricle from further contractions. They can be extirpated by opening the lower part of the ventricle, without otherwise disturbing the action of the heart.

Löwit's views and explanations may be thus reproduced. The systole commences always in the venous sinus, as inspection shows. The sinus ganglion is, in all probability, the organ starting the impulse. The ganglia in the interauricular septum suffice for the maintenance of the auricular pulsations, but since the detached auricle beats slower, it is to be assumed that they are less irritable than the ganglia of the sinus in which the impulse is started. There is no doubt a summation of nerve energy as the impulse reaches the interauricular ganglia. The ganglia at the base of the ventricle cannot start pulsations anatomically; they must be stimulated from above. They evidently serve to transmit the nerve impulse to the ventricular musculature, as is shown by the result of their extirpation. Moreover, it has been shown (Engelmann, Bernstein) that the contraction-wave is delayed in its passage from auricle to ventricle.

THE CHEYNE-STOKES PHENOMENON.—By some casual observations Luchsinger learned that the above modification of the respiratory movements could be induced in the frog by asphyxia. Further researches which he has published together with Dr. Sokolow in Pflüger's Arch. (vol. xxiii, H. 5 and 6, p. 283), have yielded some results of high interest as regards the irritability of nerve centres. The animal's brain was asphyxiated by ligature of the two aortas. The loss of irritability follows in from one to eight hours, *the quicker the higher the temperature of the animal.*

The function of the brain is annihilated first only; subsequently